

Evaluation of Multifunctional Radiation Shielding Material Against Long Duration Space Environment - Utilization of MISSE-FF, Phase I

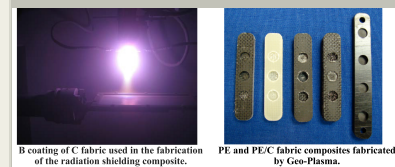
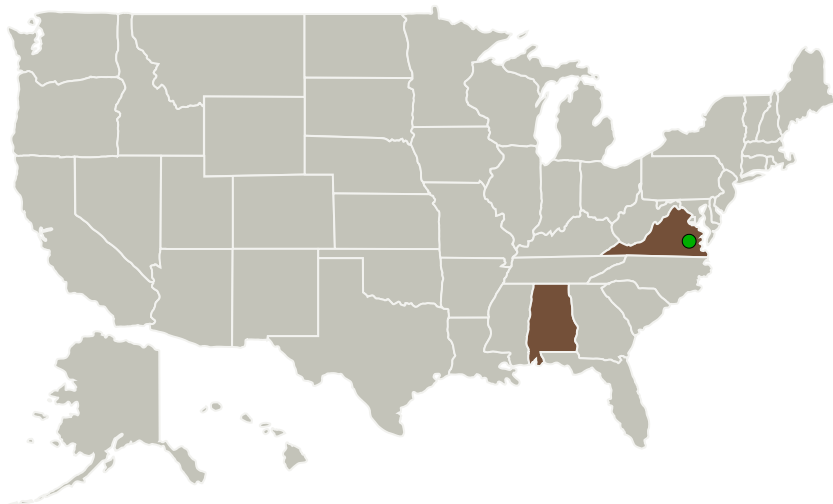
Completed Technology Project (2017 - 2017)



Project Introduction

Radiation shielding is needed to protect personnel and equipment for extended stays beyond low earth orbit. Ideally, the shielding material would be of dual use, i.e., shielding and structural. Recently, a tailorable multifunctional composite with increased structural strength combined with efficient shielding against GCR and secondary neutrons was developed by this team. For these multifunctional composites to be seriously considered for such applications as crew vehicles and habitats, their durability against the overall space environment such as atomic oxygen, UV radiation, and temperature extremes have to be evaluated. During this effort, we aim to further improve the multifunctional radiation shielding material and use the MISSE-FF facility to test our composite against the combined space environment. To further improve the shielding and structural properties of the composite, incorporation of boron nitride as nanophase particles or tubes (BNNT) and enriched boron carbide will be evaluated. Aside from having large cross-section for neutron attenuation, significant enhancements in strength and stiffness can be expected from incorporating these phases in the composite architecture. In addition to radiation and mechanical testing, these advanced composites will ultimately have to be tested against the combined space environment, which will be conducted during Phase 2 and 3 efforts.

Primary U.S. Work Locations and Key Partners



Evaluation of Multifunctional Radiation Shielding Material Against Long Duration Space Environment - Utilization of MISSE-FF, Phase I Briefing Chart Image

Table of Contents

Project Introduction	1
Primary U.S. Work Locations and Key Partners	1
Project Transitions	2
Images	2
Organizational Responsibility	2
Project Management	2
Technology Maturity (TRL)	2
Technology Areas	3

Evaluation of Multifunctional Radiation Shielding Material Against Long Duration Space Environment - Utilization of MISSE-FF, Phase I

Completed Technology Project (2017 - 2017)



Organizations Performing Work	Role	Type	Location
Geoplasma, LLC	Lead Organization	Industry	Huntsville, Alabama
● Langley Research Center(LaRC)	Supporting Organization	NASA Center	Hampton, Virginia

Primary U.S. Work Locations	
Alabama	Virginia

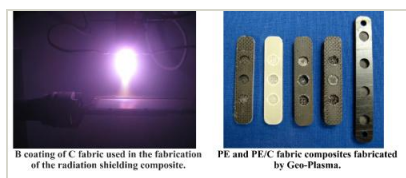
Project Transitions

**June 2017:** Project Start**December 2017:** Closed out

Closeout Documentation:

- Final Summary Chart(<https://techport.nasa.gov/file/140756>)

Images



Briefing Chart Image

Evaluation of Multifunctional Radiation Shielding Material Against Long Duration Space Environment - Utilization of MISSE-FF, Phase I Briefing Chart Image (<https://techport.nasa.gov/image/135164>)

Organizational Responsibility

Responsible Mission Directorate:

Space Technology Mission Directorate (STMD)

Lead Organization:

Geoplasma, LLC

Responsible Program:

Small Business Innovation Research/Small Business Tech Transfer

Project Management

Program Director:

Jason L Kessler

Program Manager:

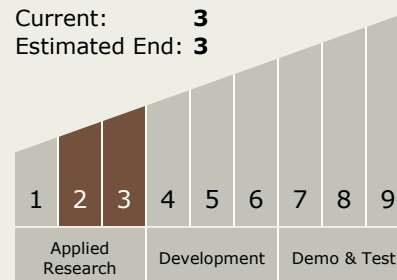
Carlos Torrez

Principal Investigator:

John Scott S O'dell

Technology Maturity (TRL)

Start: 2
Current: 3
Estimated End: 3



Evaluation of Multifunctional Radiation Shielding Material Against Long Duration Space Environment - Utilization of MISSE-FF, Phase I

Completed Technology Project (2017 - 2017)



Technology Areas

Primary:

- TX12 Materials, Structures, Mechanical Systems, and Manufacturing
 - └ TX12.1 Materials
 - └ TX12.1.6 Materials for Electrical Power Generation, Energy Storage, Power Distribution and Electrical Machines